Surface Detection and Segmentation

Dahl, Vedrana Andersen

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Vedrana Andersen Dahl
DTU Compute

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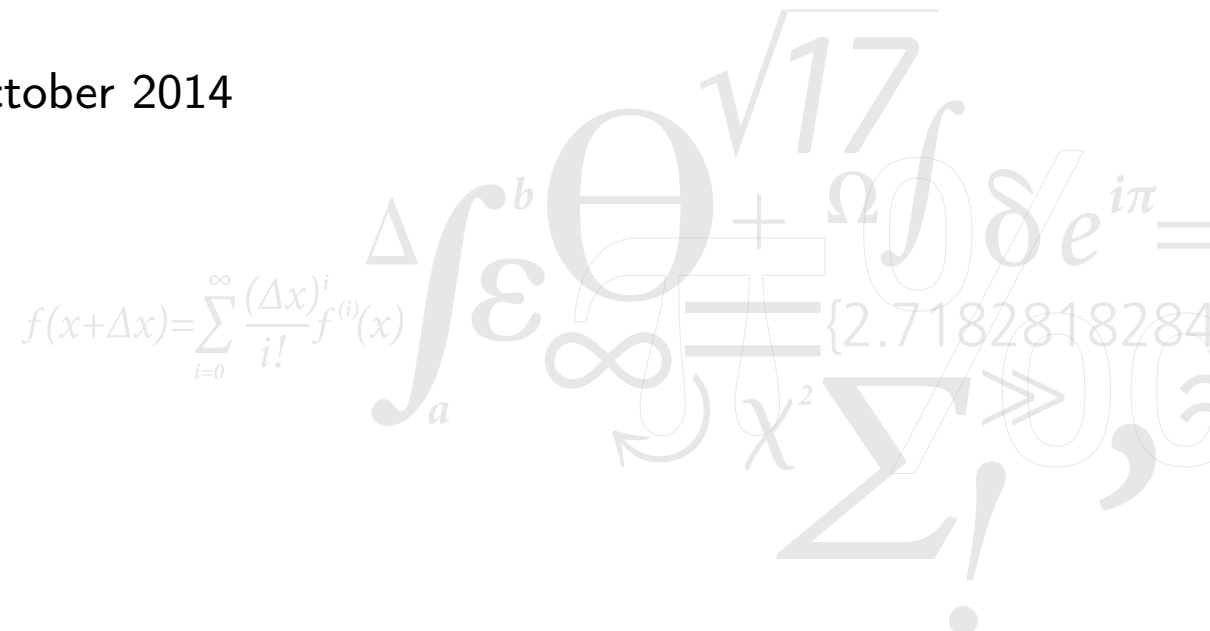
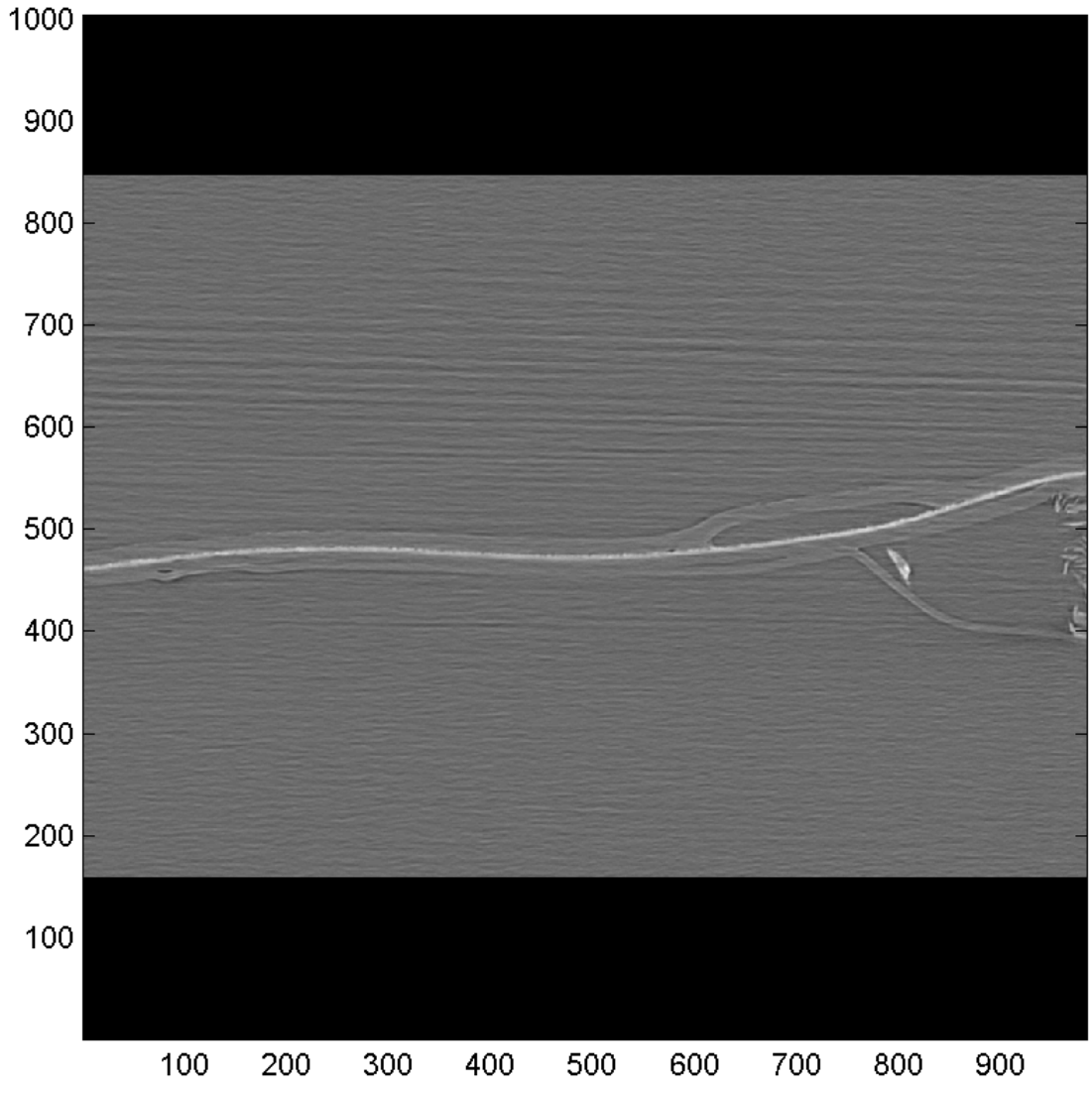


Surface detection

Motivation


1000
900
800
700
600
500
400
300
200
100
100
200
300
400
500
600
700
800
900

Optimal surface search

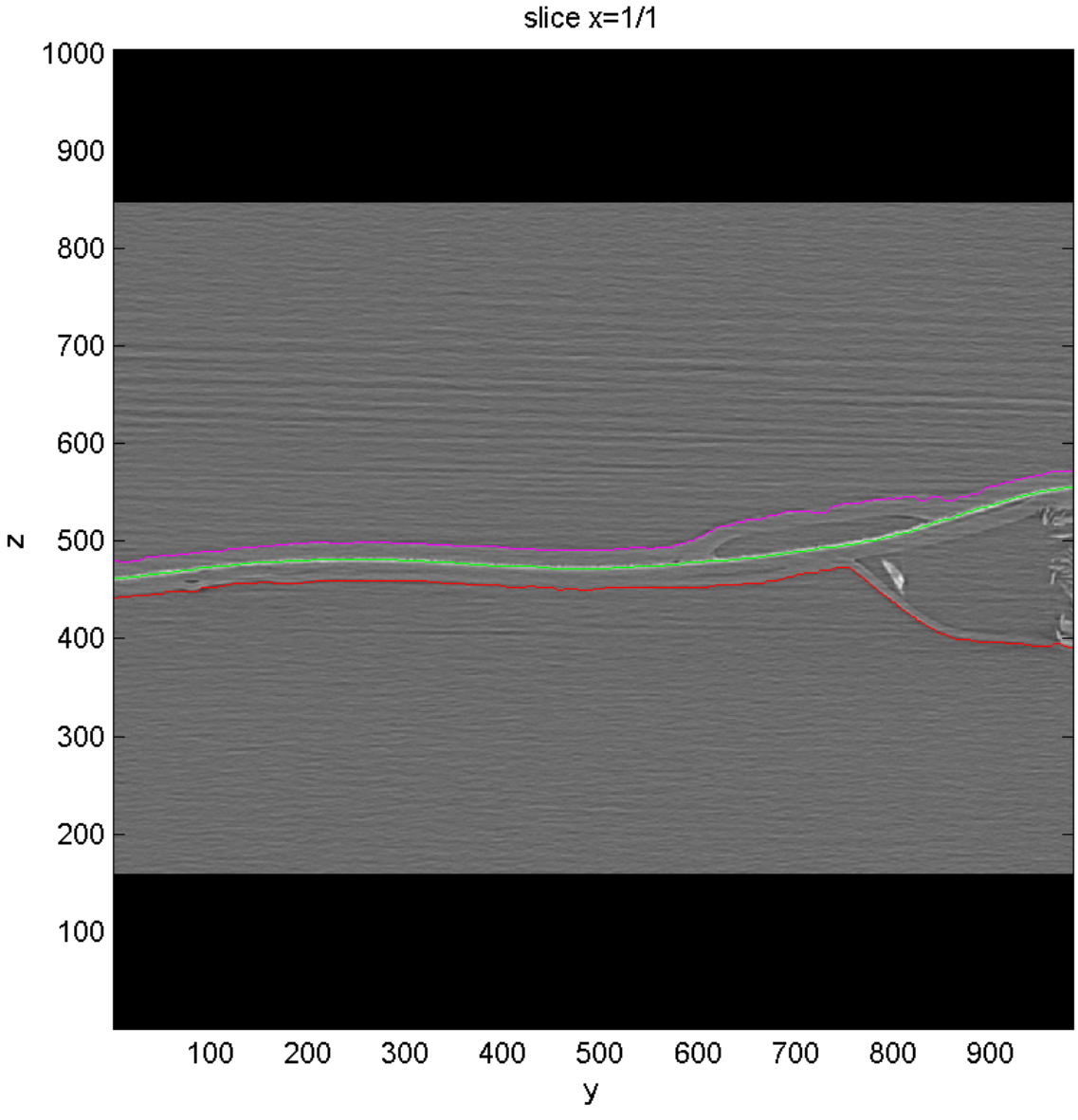
Problem

- Surfaces in 3D volume
- Local smoothness constraint
- Data suport

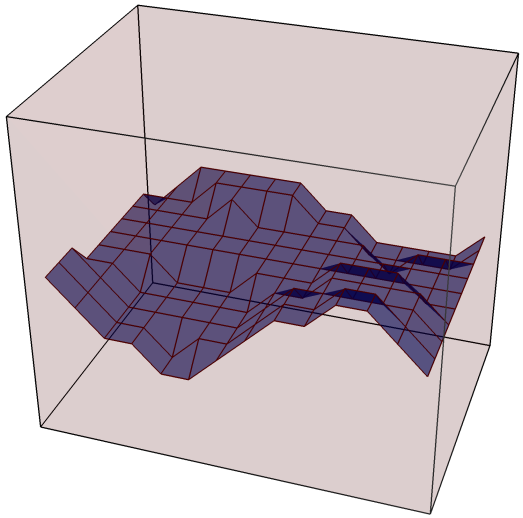
Solution

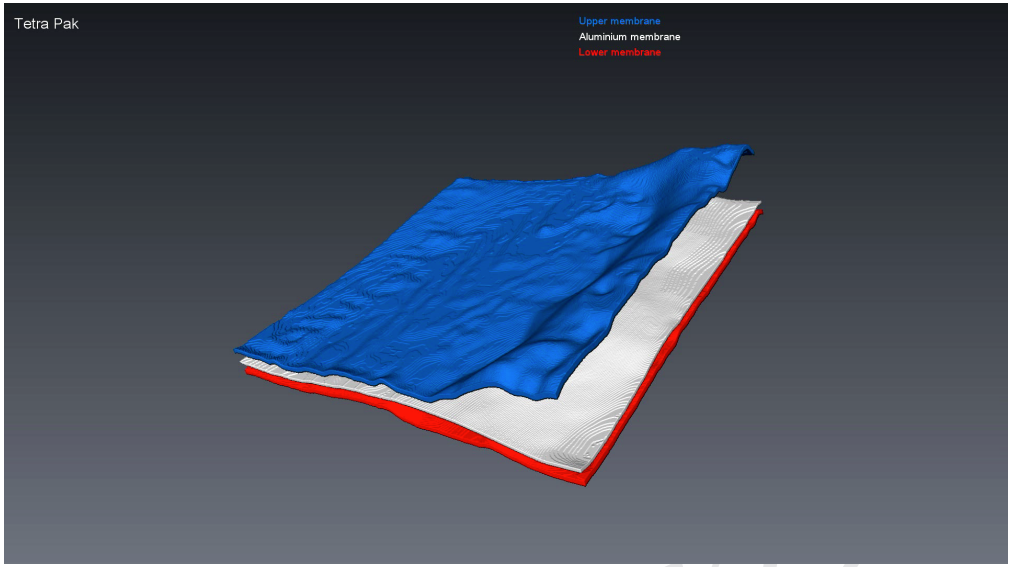
- Graph based
- Flexible

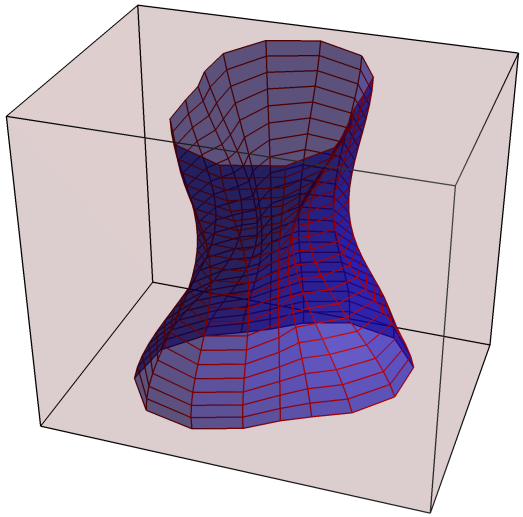
Tetrapak

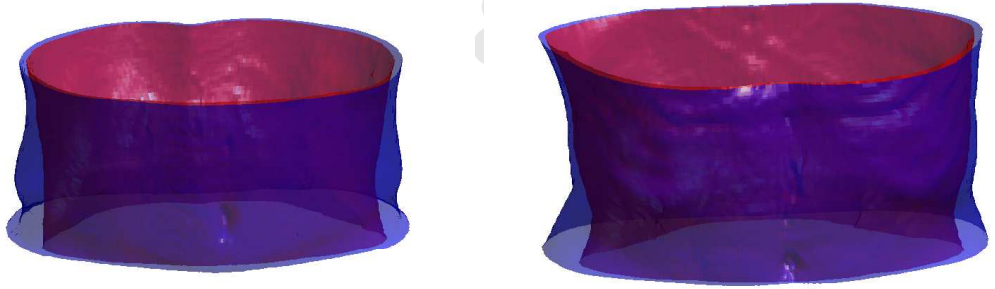

slice x=1/1
1000
900
800
700
600
500
400
300
200
100
z
100
200
300
400
500
600
700
800
900
y

Terrain-like and tubular surfaces



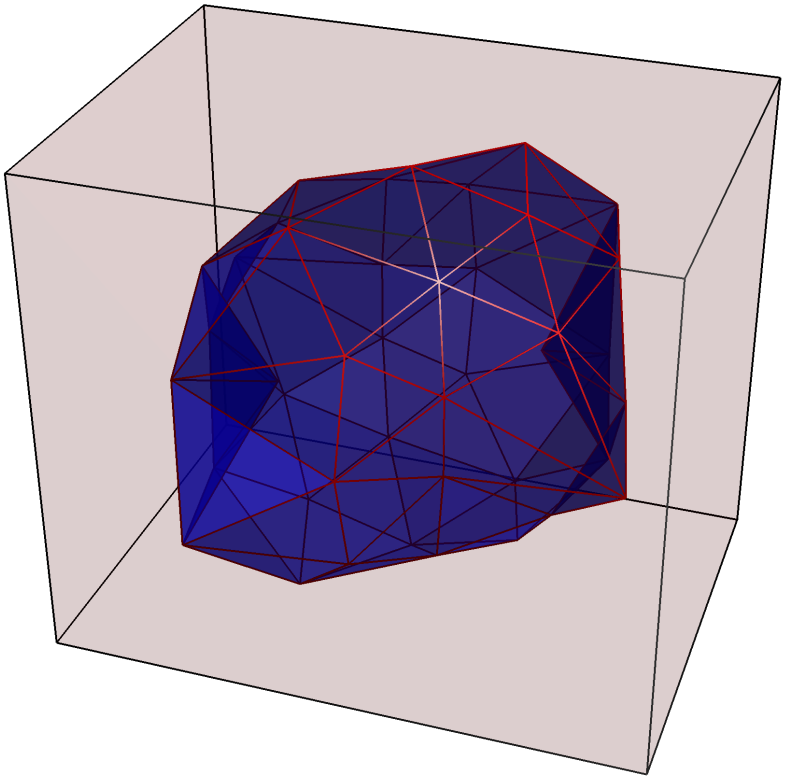




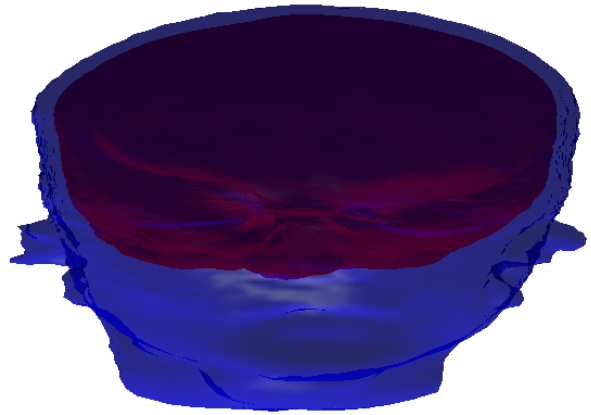


Grid based solution, allows detecting multiple interrelated surfaces

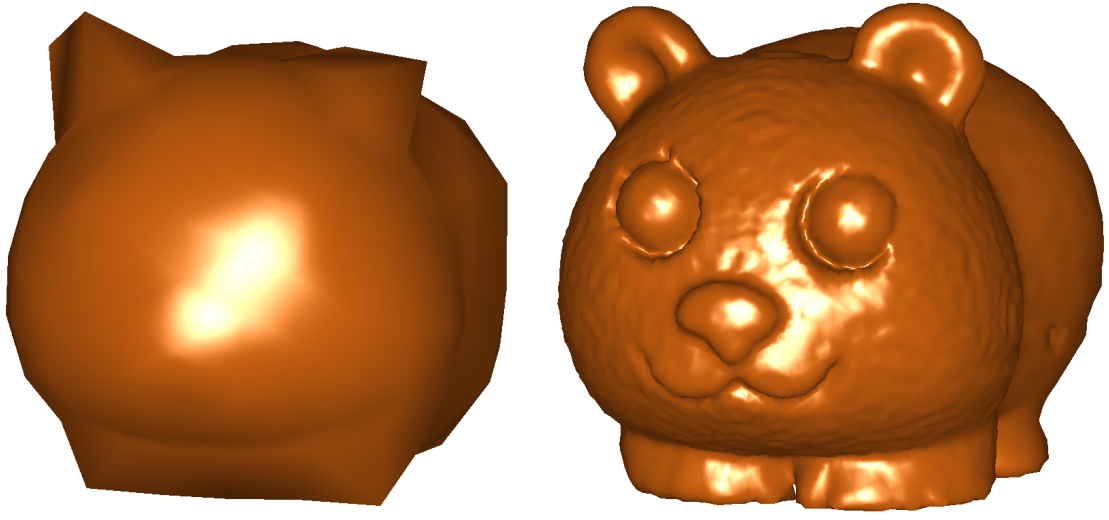
Round surfaces

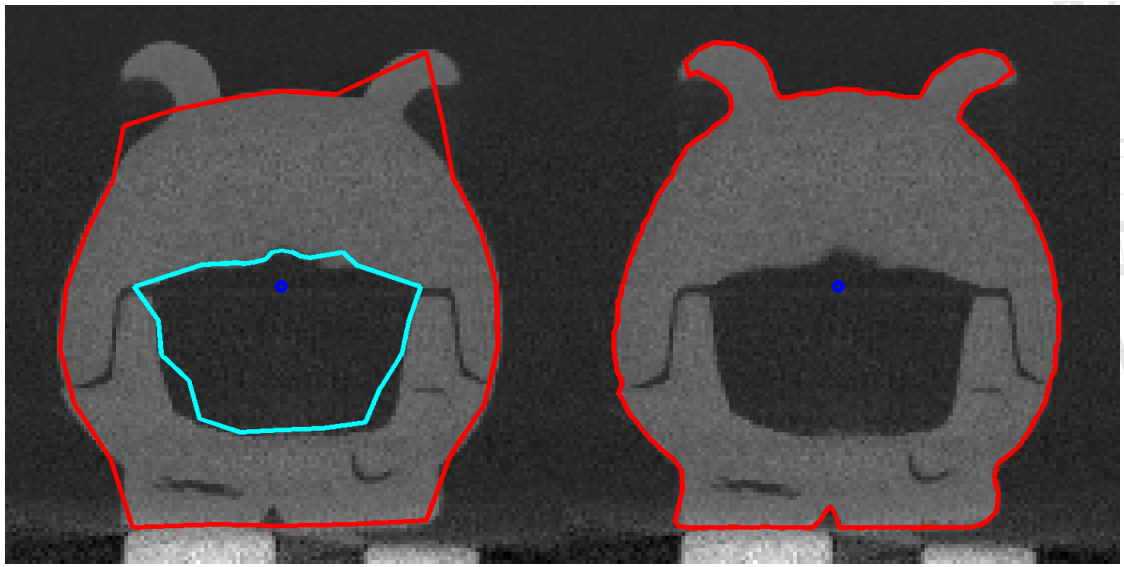


Mesh based solution



Round surfaces





Allows detecting multiple interrelated surfaces and iterative refinement

Image segmentation using the deformable simplicial complex method

Deformable models and DSC

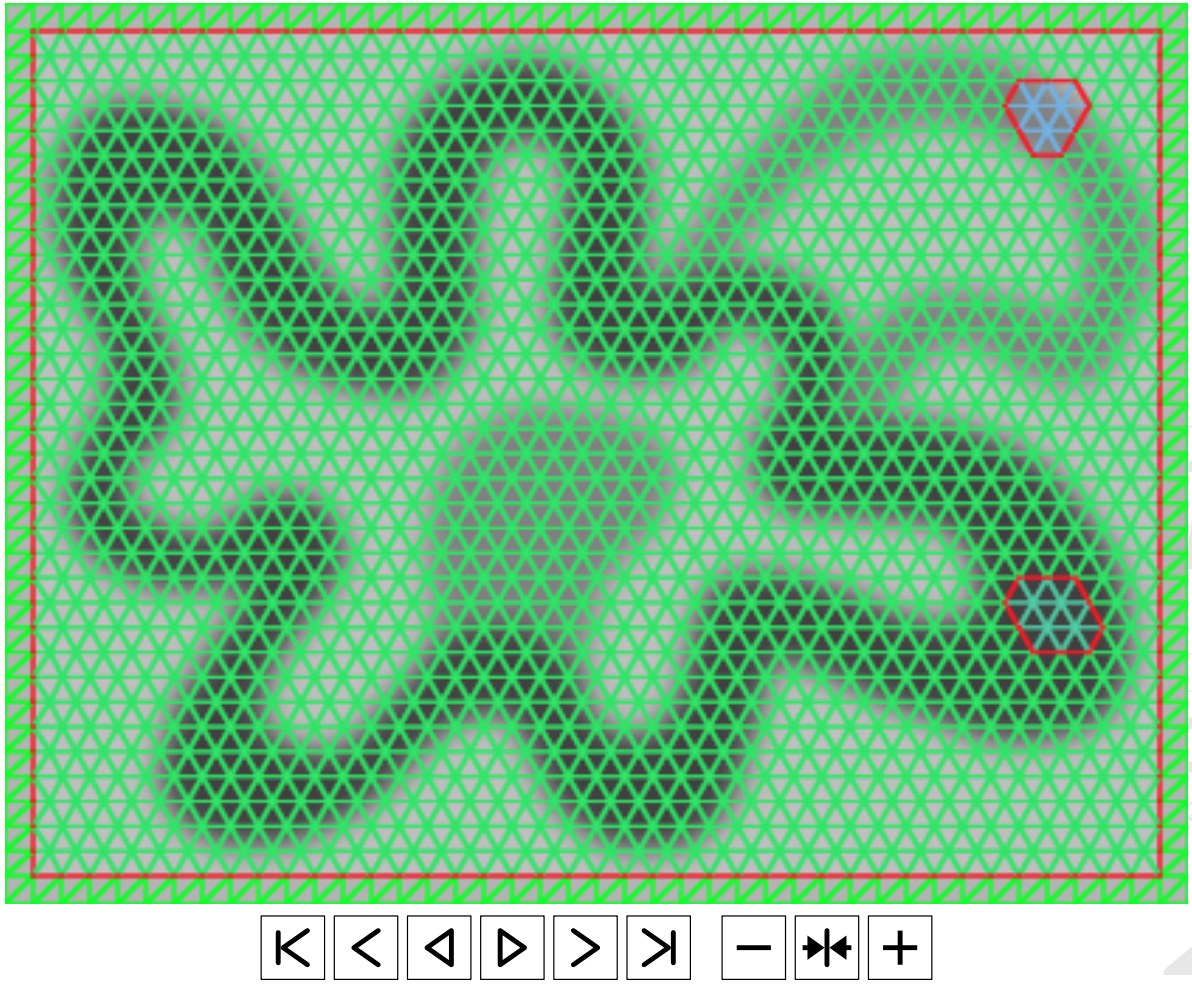
Deformable models for image segmentation

- Curves or surfaces that can move under: internal forces (smoothness or other prior info) and external forces (image or volume data).
- Depending of the representation of the interface: parametric deformable models (explicit interface, Lagrangian framework) or geometric deformable models (implicit interface, Eulerian framework).

The deformable simplicial complex method

- generic method for tracking deformable interfaces (curves in 2D, surfaces in 3D)
- applications in fluid simulation, topology optimization, now also image segmentation

DSC segmentation



Adaptive topology, multi phase support

The DSC method in 3D

DSC segmentation current work

- 3D
- Texture segmentation

Thank you!